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STATE OF THE WORLD

AND

AMERICAN LEGISLATIVE PROPOSALS

THE JOINT APPEAL IN RELIGION AND SCIENCE

1047 AMSTERDAM AVENUE NEW YORK, N. Y. 10025 212-316-7441

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THEOLOGICAL PERSPECTIVES ON ENVIRONMENT

THE JOINT APPEAL IN RELIGION AND SCIENCE

1047 AMSTERDAM AVENUE NEW YORK, N. Y. 10025 212-316-7441

RELIGIOUS LEADERS MAKE ENVIRONMENT A PRIORITY
Scripps Howard News Service
Release date: 06-10-91

By RICHARD POWELSON
Scripps Howard News Service

Leaders of most of the religious denominations in the country have met and decided to join scientists and politicians in making environmental protection a top issue.

God, many church leaders believe from a close reading of the Bible and other religious documents, is the original environmentalist.

In a joint statement, representatives of the various faiths said: ''We believe a consensus now exists at the highest level of leadership across a significant spectrum of religious traditions that the cause of environmental integrity and justice must occupy a position of utmost priority for people of faith.''

Among the faiths agreeing to the statement were Jewish, Episcopal, Church of Christ, Lutheran, Catholic, Baptist, Greek Orthodox, Methodist and Native American organizations.

The religious leaders said they will seek a meeting in Washington with members of Congress and the Bush administration to support ''bold steps'' to better protect the environment.

They also plan to focus more attention on the environment in religious publications, at local and national meetings, to offer classes for seminarians on the environment, and to set up a model facility within each faith to demonstrate environmentally sound practices to followers.

''We ... accept a prophetic responsibility,'' the statement said, ''to make known the full dimensions of this challenge, and what is required to address it, to the many millions we reach, teach and counsel.''

Sens. Albert Gore Jr., D-Tenn., and Tim Wirth, D-Colo., two of the more active environmentalists in Congress, helped organize meetings in New York City with religious leaders June 2-3, which led to the consensus statement.

''My Bible tells me,'' Gore said, ''that we've been given dominion over the Earth but that we are required to be good stewards of the Earth, leaving for every generation to follow the natural riches with which we have been entrusted.''

Paul Gorman, executive director of The Joint Appeal in Religion and Science in New York, the name of the coalition of religious leaders, said various denominations have had other issues on the front burner for years that caused them to be ''slow to address'' the environmental problems.

Gorman said religious leaders now will get more involved in congressional action, such as seeking to testify at hearings on environmental action.

''They won't be talking about fuel efficiency standards or how much global warming there is,'' Gorman said. ''Their central contribution will be to establish the moral imperative to action.''

The Bible is full of suggestions that God wants people to take good care of his creations, Gorman said.

In Genesis, for example, God puts man in the garden and tells him ''to till it and keep it,'' references to environmental stewardship.

Also, in Isaiah, Chapter 45, it says that God ''formed the Earth and made it, who alone established it -- He did not create it a waste, but formed it for habitation.''

THE JOINT APPEAL IN RELIGION AND SCIENCE

Contact:
Suzanne Bronski, Public Affairs
(212)316-7564
Paul Gorman, Executive Director
(212)316-7441

For Immediate Release

TOP AMERICAN RELIGIOUS LEADERS PLEDGE MAJOR RESOLVE ON ENVIRONMENT

NEW INITIATIVES COME FROM NEW YORK CITY MEETING WITH PROMINENT SCIENTISTS AND U.S. SENATORS

In the first such gathering of its kind, senior religious leaders of major American faith groups and denominations met on June 2nd and 3rd with prominent scientists and United States Senators and called for swift action to protect Earth's environment.

Sessions were held at the American Museum of Natural History and the Cathedral of St. John the Divine in New York City. They were sponsored by the Joint Appeal in Religion and Science, an international association established in January 1990.

In a statement released at the meeting's end, the religious leaders concluded, "We ... accept a prophetic responsibility to make known the full dimensions of this challenge, and what is required to address it, to the many millions we reach, teach and counsel.... We feel a profound and urgent call to respond with all we have, all we are, and all we believe."

Among the initiatives agreed to at the gathering was a decision by the religious leaders and scientists to convene a meeting in Washington D.C. " to meet with members of the Executive and Congressional branches to express our support for bold steps on behalf of environmental integrity and justice."

Participants and signatories to the statement included, from the Protestant and Orthodox world, the leaders of the World Council of Churches, the National Council of Churches, the Episcopal Church, the Methodist Church, the Lutheran Church, the Greek Orthodox Church, the National Baptist Convention, and the American Baptist Church. The Roman Catholic community was represented by the Chairman of the National Conference of Catholic Bishops' Committee for Science and Human Values. Leaders from all four branches of the Jewish community included heads of major seminaries and the President of the orthodox Rabbinical Council of America. Completing the delegation were distinguished representatives of evangelical Christian, Southern Baptist and Native American organizations.

Senator Albert Gore, Jr., Senator Timothy E. Wirth and Representative William Green composed the bipartisan congressional delegation which was deeply involved in the deliberations. Of the

- more -

religious leaders' proclamation, Senator Gore said, "This statement of principles and action represents a vital new commitment and growing awareness of our responsibility to the Earth, of our responsibility as stewards of the Earth."

Among the scientists present were Dr. Carl Sagan, Dr. James Hansen, whose research and testimony before Congress have helped awaken worldwide attention to global warming, Dr. F. Sherwood Rowland, president-elect of the American Association for the Advancement of Science, who first documented evidence of a hole in the ozone layer, Dr. Peter Raven, a foremost expert on species extinction, and Dr. Anne Whyte, prominent scholar on population and development. Also participating was Ambassador Richard Benedick, who was responsible for helping to negotiate the Montreal Protocol on ozone depletion.

Dr. Sagan, co-chair of the Joint Appeal in Religion and Science, described the statement as "a courageous and historic commitment to cherish and protect the Earth by a broadly ecumenical gathering of American religious leaders. It affirms the joint responsibility of religious and political leaders, scientists, and citizens nationwide to work together to preserve the environment on which all our lives depend."

Reviewing scientific evidence of perils to planetary environment, the religious leaders called for:

* accelerated phaseout of ozone depleting chemicals
* much more efficient use of fossil fuels and the development of a non-fossil fuel economy
* preservation of tropical forests and other measures to protect biological diversity
* concerted efforts to slow the dramatic and dangerous growth in world population through empowering both women and men, encouraging economic self-sufficiency, and making family planning services available to all who may consider them on a strictly voluntary basis

"We reaffirm here, in the strongest possible terms," the religious leaders added, "the indivisibility of social justice and ecological integrity. Economic equity, racial justice, gender equality and environmental well-being are interconnected and all are essential to peace."

Commenting on the past role of the religious community on these issues, the leaders noted that it had taken much time and reflection, "to start to comprehend the full scale and nature of this crisis and even to glimpse what it will require of us." Many people, especially the young, have been seeking to know where religious leaders stand and what they intend to do.

As a result of their meeting, and confirmed by a 60-page report, "A Guide to the Environmental Activities in the American Religious Community" prepared for the meeting, they concluded, "We believe a consensus now exists, at the highest level of leadership across a significant spectrum of religious traditions, that the cause of environmental integrity and justice must occupy a position of utmost priority for people of faith." The Very Reverend James Parks Morton, Dean of the Cathedral of St. John the Divine and co-chair of the Joint Appeal in Religion and Science, said, "what many of us see happening here is not only the engagement by the religious community of a new issue, but also the beginning of a new chapter in American religious life itself."

The group agreed to continue its consultations, maintaining close consultation with scientists and Senators. As well as agreeing to convene a meeting with the administration and Congress, the group pledged to:

* reach out to other leaders "across the broadest spectrum of religious life"
* convene a meeting of seminary deans and faculty to develop curriculum emphasizing stewardship of Creation
* prepare educational materials for congregations
* establish a mechanism to place stories on environment in faith group newsletters and assure coverage of religious activities on environment in the secular press
* urge compliance with the Valdez principles and "preach and promote corporate responsibility"
* encourage establishment of one model environmentally sound facility within each faith group and denomination

In a letter to the meeting, leaders of major environmental groups hailed the meeting's "spirit of urgency and commitment to action." "The American religious community has a critical contribution to make to the cause of environmental integrity," they wrote. "Humanity needs a great movement of heart and spirit to motivate a new and caring relationship to Creation." Signatories of the letter include heads of the Natural Resources Defense Council, the National Audubon Society, Friends of the Earth, National Toxics Campaign, the Wilderness Society, Environmental Defense Fund, Sierra Club, National Parks and Conservation Association, Union of Concerned Scientists, World Resources Institute, Sierra Club Legal Defense Fund.

Finally, the religious leaders stressed that they viewed questions of environment not simply as one issue among many other pressing matters, but as a fundamental challenge reaching the heart of present and future theology and observance. "This is an inescapably religious issue," they affirmed in their statement. "In this challenge may lie the opportunity for people of faith to affirm and enact, at a scale such as never before, what it truly means to be religious."

Note: Copies of "A Guide to Environmental Activities in the American Religious Community" are available for editors by calling (212) 316-7564.

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WORLD RESOURCES INSTITUTE

1709 New York Avenue, N.W., Washington, D.C. 20006, Telephone: 202-638-6300
Facsimile: 202-638-0036 Telex: 64414 WRIWASH Direct Dial: (202) 662-

MAN AND NATURE: THE FUTURE OF THE GLOBAL ENVIRONMENT

by

Jessica Tuchman Mathews, Ph.D.

presented at

"A Festival of Creation"
Washington National Cathedral

Washington, D.C.
May 19, 1990

The great French biologist and Nobel laureate, Jacques Monod, concluded not long ago, that "Mankind was mother nature's only serious mistake." A newspaper reader attentive to the health of the global environment in the 1980s, might almost have been tempted to agree.

Consider for a moment a few of the events of this past decade: the oil price rise and widespread shortages at its beginning; the chemical accident at Bhopal; the decimation of European and high altitude U.S. forests from acid rain and other air pollutants; the explosion at Chernobyl; ozone depletion and the discovery of a "hole" in the ozone layer over Antartica; drought and famine in Africa; the Rhine river chemical spill; the homeless freighter that sailed the world for two years without finding a place to unload its toxic cargo; steadily rising rates of tropical deforestation and of species extinction; closed beaches from Western Europe to the Baltic to New Jersey; the Exxon Valdez oil spill; and, as the decade closed, an outbreak of freakish weather - drought and record-breaking heat in the U.S., devastating floods in Bangladesh, the most powerful hurricane ever measured, and the warmest winter in Moscow in more than a century - all bringing intense new concern to the possibilities of global warming.

There were more hungry people on the planet as the 1980s drew to a close than ever before. Seven hundred to eight hundred million people, outside of China, eat fewer calories than are necessary for an active life. Malnutrition is a major factor in the deaths of

25,000 infants and children under five each day. Even where adequate calories are available, clean water, which is equally essential, often is not. Waterborne disease, whose solutions are environmental, rather than medical, remains a scourge. Two hundred million people are sick with schistosomiasis, 175 million with malaria, 450 million with hookworm, river blindness and sleeping sickness affect 20 million each.

The 1980s also brought rich new scientific insights. As scientists studied the chemical elements essential to life - carbon, nitrogen, phosphorous and sulfur - they quickly found that their natural cycles through earth, air, water and living things were being affected on a global scale by human activities. Non-chemical changes are equally massive. On land, soil erosion and deforestation are accelerating the flow of sediments and nutrients to the ocean in some places, while dams built for irrigation and electricity interrupt the natural flow in others. The permanent loss of species - now estimated to stand at four per hour - utterly disrupts the natural balance between speciation and extinction.

The more closely scientists looked at the planet's structure and metabolism, from the top of the stratosphere to the ocean canyons, the more the evidence of rapid change accumulated. A sense of urgency gradually filtered through to governments that man is now the principal agent of environmental change on the planet, and that if humanity is to live successfully with its ability to alter natural systems it must first understand those systems and the ways in which human society depends on their normal

functioning. Unless policies change, some scientists warn, man's impacts on the planet are so profound and are accumulating so rapidly that irreversible damage could occur - to put it bluntly - before we have any idea of what we are doing. Since man's ability to tinker inadvertently with the basic physiology of the planet is new in history, it is worth spending a few minutes to look at these changes in more detail.

At the core of all environmental trends lies population growth. It took 130 years for world population to grow from 1 billion to 2 billion; it will take just this decade to climb from 5 billion to 6 billion. Though the rate of growth is slowing, the human family grows by 93 million each year - a larger increment than ever before. Africa, already mired in poverty and struggling against a falling per capita GNP, will add more than the present population of the U.S. between 1980 and 2000. If fertility continues to decline at its present slow rate, demographers predict that the human population will level off at a staggering 14 billion - almost triple today's population, not at the 9 or 10 billion that seemed most likely just a few years ago.

No simple relationship links population levels and the resource base. Policies, technologies and institutuions intervene between population growth and its impacts and can spell the difference between a highly stressed, degraded environment, and one that could sustainably provide for many more people. Sometimes absolute numbers are crucial. Most often, though, the rate of growth is most important. Whereas a government might be fully

capable of providing food, housing, jobs and health care for a poulation growing at one percent per year (and therefore doubling in 72 years), it might be completely overwhelmed by an annual growth rate of three percent, which would double the population in 24 years.

While the U.S. and the Soviet Union are each growing at just under one percent per year, and Europe only half that fast, Africa is expanding by about three percent annually and Asia and Latin America by about two percent. By 2025, the working age population in the developing countries alone will be larger than the world's current total population. Clearly these countries face an urgent choice. For many of them, current rates of growth mean that available capital will be swallowed up in meeting the needs of today's populations rather than invested in the job creation and resource conservation that will be needed to sustain their children. And of course, there are global impacts as well.

The most serious form of renewable resource decline is tropical deforestation. Globally, 10 trees are being cut down for every one that is replanted, and an area twice the size of Austria is deforested each year. These luxuriant forests are deceptively fragile. Once disturbed, the entire ecosystem can unravel. The loss of the trees interrupts nutrient cycling; the soil loses fertility; plant and animal species lose their habitat and disappear; acute fuelwood shortages arise (especially in the dry tropical forests); without groundcover the soil erodes, and downstream rivers suffer siltation, causing both flooding and

droughts, and damage to expensive irrigation and hydroelectric systems on which hopes for economic growth are pinned. Planned to last for 50-100 years, the dams can silt up almost overnight, leaving only foreign debt as a legacy. The record is probably held by a large dam in China which silted up completely in 4 years.

Traced through its effects on agriculture, energy supply and water resources, deforestation impoverishes about a billion people, and often leaves political as well as economic chaos in its wake. In Haiti, many of the boat people who fled to the U.S. left because of the brutality of the Duvaliers. But many were forced into the boats by the impossible task of farming the bare rock left behind by near total deforestation and soil erosion. Haitians are by no means the only environmental refugees. No one knows the true numbers, but in Indonesia, Central America, and sub-Saharan Africa, millions have been forced to leave their homes in part because the loss of plant cover and the consequent disappearance of soil have made it impossible to grow food. Where the refugees settle, they add to the local demand for food and put new burdens on the land, spreading the environmental stress that forced them from their homes like a disease. Resource mismanagement is not the only cause of these mass movements, of course. Religious and ethnic conflicts, political repression and other forces are at work. The environmental causes are simply the most often ignored.

The tropical forests also harbor most of the planet's genetic wealth, the heritage of 3.5 billion years of evolution. This diversity is therefore vanishing on a scale not seen since the

disappearance of the dinosaurs. Extinction is a normal part of nature, but today's rate is 1,000-10,000 times greater than the natural rate. With the loss already at 100 species per day, one-fifth of all the species living in 1980 may be gone by the end of this decade.

The loss will be felt aesthetically, scientifically, and economically. Its costs are impossible even to estimate. A few years ago, a Mexican graduate student stumbled upon a primitive form of perennial corn which appears to exist nowhere else in the world but on that single hilltop, and which would have been quickly wiped out but for his alertness. If the perennial character can be bred into commercial corn its environmental and economic value will be enormous.

Genetic diversity is a virtually untapped resource. Man currently makes use of less than one percent of what is available. Among the vast numbers of unused types of edible plants, for example, are a great many with equal or greater potential than the few that now form the basis of the human diet. The bitter irony is that genetic diversity is being lost on a grand scale at the very moment when biotechnology makes it possible to fully exploit the resource for the first time.

The most truly global and potentially threatening of environmental trends is greenhouse warming. The greenhouse effect results from the fact that the planet's atmosphere is largely transparent to incoming radiation from the sun but absorbs much of the lower energy radiation re-emitted by the earth. The effect is

a natural phenomenon that makes the earth warm enough to support life. But as emissions of greenhouse gases increase, the planet warms unnaturally. Carbon dioxide, the product of all combustion and therefore of all fossil fuel use, is the principal greenhouse gas.

There are many uncertainties about greenhouse climate change, but a scientific consensus exists on its central features: the soundness of the theory; the identity of the greenhouse gases; the rate at which their concentrations are growing, and in most cases, the reasons for that increase. There is also agreement that global average temperature has risen by slightly more than half a degree C since the industrial revolution began - at the low end of the range the theory predicts. The uncertainties arise over how much warming will result from added greenhouse gases, and how fast it will occur. The questions, in short, are not whether, but when and how much.

Hotter temperatures are only one of the expected results. Precipitation patterns would shift, perhaps causing Dust Bowl-like conditions in key grain producing areas. Ocean currents may also shift, dramatically altering climate. A diversion of the Gulf Stream, for example, would make Western Europe far colder than it is today. Sea level would rise due to thermal expansion of the oceans and the melting of land-based ice. The predicted rise would inundate large coastal regions, erode shorelines, destroy coastal marshes and swamps (both areas of very high biological productivity), affect water supplies through the intrusion of salt

water, and put at high risk the vastly disproportionate share of the world's economic infrastructure that is packed along coastlines. The great low-lying river deltas, from the Mississippi to the Nile and the Ganges, would likely be flooded. Some island nations would disappear altogether.

There would be positive consequences as well. Some plants would grow more quickly (though many - alas - will be weeds), fertilized by the additional carbon dioxide. Rainfall may rise in what are now arid but potentially fertile regions. Conditions for agriculture may also improve in some northern regions. The net effect, however, is almost certain to prove costly to all countries because all depend so heavily on the normal, predictable functioning of the climate system. Adapting to a changing climate, where that is possible, and when the impacts can be predicted in time, will be very expensive. Developing countries, with small reserves of capital, few scientists and engineers, and weak central governments, will be especially hard hit. Many needed adaptations will be prohibitively costly, and some of the most severe impacts, such as those on wildlife and ecosystems, will be beyond the reach of human correction.

Greenhouse warming is closely linked to stratospheric ozone depletion which is caused by a group of manmade compounds known as chlorofluorocarbons, or CFCs. These, it turns out, are also potent greenhouse gases. The increased ultriolet radiation caused by ozone loss will produce an increase in skin cancers, eye damage, crop loss and other as yet unknown impacts on plants and animals,

including perhaps the suppression of immune systems.

Ozone depletion is a valuable object lesson in environmental humility. Chlorofluorocarbons were thoroughly tested when first introduced and found to be completely benign. Their possible effect on the remote stratosphere was simply never considered. More than a decade after the effect was discovered, a related phenomenon came to light, that led to a continent-sized "hole" in the layer over Antarctica. This history reminds us that our present knowldege of planetary mechanisms is scanty. The possibility of surprise, possibly quite nasty surprise, must be placed rather high on the list of likely outcomes. The greatest risk may well come from a completely unanticipated direction, for we lack both crucial knowledge and early warning signals.

Do all these trends mean that the human prospect is bleak? Certainly, we - the human species - can not go on as we are without fundamental change. Without it there is no way the planet can accommodate a doubling or more of population, at least a fivefold rise in economic output and a tripling of energy use all by the middle of the next century. We will need to redesign our technologies from the inside out, rather than continue to fiddle with what comes out the end of the pipe. The new designs must follow nature's example in which there are few if any wastes, materials are used with high efficiency, and every byproduct is used as the starting point in other processes. Look in a biochemistry text and you will see that all of nature's systems are circular designs. Nothing is linear, as most manmade processes are.

Such change is well within our technological capacity. With only a modest effort many of our present practices could be made to look primitive. The U.S. could cut its energy use in half with presently available technologies, and there is no telling what could be achieved through a determined research effort. We use a billion pounds of pesticide each year, less than one percent of which reaches a target pest. It should not be beyond us to increase that number three, five or ten fold. Our transportation system uses marginal improvements on 50 and 100 year old technologies. The hottest thing in mass transit right now is so-called "light rail" - which is just another name for the trolley car, a technology that was introduced in the 1880s. We have not begun to use the revolutionary power of information and communications technologies to transform transportation just as they have transformed banking, publishing, retailing and just about everything else. In short, we have not yet really tried to make technology serve nature instead of letting nature serve technology as a source of resources and repository for wastes.

Yet even with that ambitious goal, technological change will be the easiest part of the challenge that lies ahead. The difficult part will be understanding what we are doing to the planet before it is too late, summoning the will to choose a different future, and developing the new rules and institutions that will enable us to travel that different path. That is a tall order, I know, but notice what is not included. I do not believe that we need to change human nature or human values. We will have to change how we

think - especially about the future - and how we behave - especially as a global community. But change in thought and behavior, even in deeply ingrained habit, is well within what history tells us is possible. Indeed, thought and behavior can change quickly and profoundly as conditions and institutions change. Human slavery once seemed essential to economic success, morally acceptable, even ordinary. Now it is unthinkable.

How we act is a function of what we see in the world around us, and what we see is a function of what we understand. Thus science is a powerful shaper of human behavior. From Newton to Einstein our concept of the physical universe changed our way of thinking. Darwin certainly did too. Perhaps now it is Lovelock's turn. Lovelock proposes a theory he calls Gaia after the Greek earth goddess. Gaia sees the earth as a living organism in which the non-living realm is continuously shaped by the presence of life. Not just species evolve in the Gaian view, but species and their living and non-living environment together. Thus the apparent planning and sense of purpose that natural selection produces - and which has always been so hard to grasp - is broadened to include the entire planet. It is far too early to say that Lovelock is correct, but the theory has generated exciting research, which is always suggestive. If Gaia is correct, it will force us to shift our focus from an overriding concern for the welfare of our own species to that of the planet as a whole.

Science regularly makes a fool of anyone who tries to predict its future. Darwin himself wrote in his Autobiography, "I rejoice

that I have avoided controversies." But I will take the risk and hazard a guess that the revolutionary sciences of our time (just as astronomy and physics have been in the past), will be ecology and the study of earth as a living whole.

From that science will come the realization that despite technology, and what our major religions have taught, beginning with Genesis, man does not exercise dominion over nature. The reverse may well be closer to the truth: nature rules man, both because it shapes our minds, bodies and spirit and because we are, and will always remain, so economically dependent upon it. Our world view now is that man is not only above, but separate from nature, which exists solely to serve his purposes. We do not need to go to the other extreme as some suggest, and see ourselves as no different from nor better than a chimpanzee or a guppy. We can continue to view ourselves as the peak of creation, but we must discard our misguided sense of separatness. In that endeavor lies a great task for organized religion.

Those whose work keeps them closest to nature understand this best. They learn that, except in a narrow sense, or over a short term, it is hard to do better than nature. Let me give you a very simple example. When foresters first began to plant trees where old forests had been cut, they had a terrible time. The new forests looked nice, full of young, healthy trees with clean trunks and without crumbling dead trees in the way, but they didn't grow well. Slowly the foresters learned that everything in the natural forest served a purpose: without the dead hollow trees for owls and

woodpeckers to nest in, insect populations got out of control; without the lichen that coats the trunks of old trees, forests could not fix enough nitrogen from the air to fertilize themselves.

Usually, the connections are harder to trace. The human system appears to outperform nature, but only till we count the cost in some other place or at some later time. This is a lesson that will have to be learned again and again. As human demands on the planet accelerate, we will learn the lesson on a larger and larger scale, until eventually we learn to incorporte it into how we think and behave.

The influence of nature on man's spirit should also be a positive force for change. It is the source of man's creativity. Probably the original inspiration for stained glass, like the magnificence that surrounds us, came from someone who had seen how sunlight filters through the leaves of a high tree canopy. Each of us has experienced the force with which a beautiful day lifts the spirit even in the middle of a city. We know the strength of our connection to certain species: witness all the fuss over the three trapped whales a few years ago. And we need wilderness, not just for recreation, but as Wallace Stegner wrote, "for spiritual renewal, the recognition of identity, and the birth of awe." I may be too optimistic here, because of course these connections have always been with us and in recent centuries haven't been notably influential. But perhaps as nature grows ever more threatened, its value will seem more obvious and urgent. Or perhaps as we see less of nature, it will be all the easier to lose.

If science, religion, and man's emotional connections to nature can reshape how we perceive our role on the planet, then institutional changes can pave the way to new policies and economic behavior. Prosaic and rather simple changes will have a sweeping impact. For example, economic indicators currently ignore environmental costs. When countries calculate their national income accounts - their GNP - they value and depreciate everything manmade, even intangibles like knowledge. But the accounts completely ignore environmental resources. The result is policies that can not distinguish between using income - say, the sustainable yield of lumber or fish - and a capital asset, namely the forest or fishery itself. In the private sector, we have indicators that measure how efficiently labor and capital are used, but nothing that measures environmental productivity - how much resources are used and emissions produced per unit of economic output. Changing these and other signals, to which policymakers are exquisitely tuned, will automatically and effortlessly go a long way toward turning bad policies into good ones.

Global environmental trends all pose potentially serious losses to national economies, are immune to solution by one or a few countries, and render geographic borders irrelevant. The internationalization of finance and industry and the boundary-erasing effects of remote sensing technology and linked computers, have the same effect. Even the amount we travel makes health policy, once solely a domestic prerogative, into an international issue. These invasions of national sovereignty make governments

less central than they once were. I don't mean to suggest that nation states will disappear, but some of the powers they have held will be inherited by other actors: by individuals, the business sector and international organizations.

Individuals have a particularly important role to play. First, because changes in thought and understanding come from people, not institutions. Individuals will also provide much of the impetus toward a functioning global community in place of today's collection of nations. Working through their own international communities - science, business, labor, citizen activism, and so on - people offset the centrifugal forces that govern relations among states. Jean Monnet, the father of the European Community, knew this when he described his intention as "not to form coalitions between states, but union among people." That Monnet's wild dream is now a reality, and that Europe is in the longest period of peace in its history, is to me another hopeful portent.

Whether each of our individual preferences is for scholarship or business, civic action or research, the nudge of a petition or the slap of a lawsuit, all of us must believe and behave as if, to paraphrase another famous frenchman, the fate of the planet is too important to be left to governments. Individual efforts in the face of problems which have a global dimension may seem inadequate, even futile. But, in aggregate, they are not. "Your actions may seem insignificant", Gandhi said, "but it's crucial that you do them".

For all that can be achieved outside of government, changes in national policy are also absolutely vital. Looking at the United

States today and over the past decade, one can not be very hopeful about the prospects for leadership in the Executive or the Congressional branch. Despite the manifest flaws in our political system as it functions today, I can not put all of the blame on politicians, because leadership is a two-way street.

Leaders need followers who are willing to be led. We Americans have given no sign that we would reward leadership no matter how enlightened or beneficial. We need to care a lot more about our federal government and demand a lot more of it. We should insist that it provide what we want, while being more honest in matching those expectations with our willingness to pay. We must stop being diverted by phony debates over manufactured symbols and images. We need to care more about the budget and less about flag burning. Let's get rid of those who are content to do nothing more than nurse along a manifestly inadequate status quo, and seek out those who are determined to do better. And when we find leaders like that let's do what's necessary to elect them and then hold them accountable.

You will have gathered by this time that I am optimistic about our ability as a species to develop a permanent modus vivendi with the earth. Being an intensely pactical person I have no other option. But I do not underestimate the challenge. Indeed it is in part because present policies are so bad that I see so much room for improvement. I also believe that a positive outlook is an essential ingredient of success. If our aim is merely to make a bad thing marginally better, we will never unleash the necessary energy

and motivation. We need to believe in something bigger than fear of the consequences of inaction.

The historian Barbara Tuchman wrote that "We cannot reckon on the better impulses predominating in the world, only that they will always appear." They are appearing now, in thousands of gatherings like this one that would not have taken place even a few years ago. Our job is to seize this fleeting opportunity and to blow the scattered sparks into a bonfire for change.